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HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 1395
Baltimore 3, Maryland

SR No. 5
17 October 1955

ARDC SYSTEM REQUIREMENT

1. DIRECTED ACTION

Submission, upon request, to Headquarters ARDC (Western Development Division) of information necessary for the preparation of a System Development Plan by the following participating centers is directed:

a. Wright Air Development Center.

b. Air Force Cambridge Research Center.

c. Holloman Air Development Center.

d. Rome Air Development Center.

e. Arnold Engineering Development Center.

f. Air Force Missile Test Center.

g. Air Force Personnel and Training Research Center.

(UNCLASSIFIED)

2. GENERAL INFORMATION

a. Title: (UNCLASSIFIED) Advanced Reconnaissance System.

b. System No: 117L

c. Responsible Agency: Headquarters ARDC (Western Development Division) is responsible for preparation of a System Development Plan based on the requirements contained herein in accordance with ARDCM 80-4, dated 1 July 1955.

d. Target Dates:

(1) Submission of System Development Plan to Headquarters USAF: 1 April 1956.

This SR supersedes SR No 5, dated 29 November 1954, title, "Advanced Reconnaissance System."

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SAFSP P30 C5-628[illegible]

(2) Operational time period of this system: Prior to 1965 through 1970 (See par 5a).

e. Participation, Coordination, or Interest:

(1) Air Materiel Command - ([illegible]).

(2) Air Proving Ground Command - (P).

(3) Air Training Command - (P).

(4) Strategic Air Command - (C).

(5) Air Defense Command - (C).

(6) CNO, USN - (I).

(7) C/S, USA - (I). (8) CIA (I)

f. Funding Information: Funds for this program are carried for FY 1956 under BPSN 2-1115.

g. References

(1) GOR No: 80 (SA-2c), dated 16 March 1955.

(2) DD Form 613, title, "Advanced Reconnaissance System", Project No. 1115, dated 19 April 1955, RCS: DD-R&D/A/119.

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3. REQUIREMENT

a. General Philosophy

In order to permit selection of the most effective approach to an Advanced Reconnaissance System concept which utilizes an earth satellite as a system platform, it is essential that the existing and projected state-of-the-art in this field be adequately surveyed, and a determination made through system design studies by selected contractors, of the technical and economical magnitude of full system development effort. From these studies there will be prepared a Development Plan which will be used as a basis for choice of the Advanced Reconnaissance System to be developed for the Air Force inventory. It has been generally accepted that, with the advent of the very high yield super weapon, strategic target intelligence requirements for efficient use of such a weapon have become far less detailed than heretofore; but at the same time, the requirement for routine surveillance of an enemy's territory becomes all the more necessary to anticipate and circumvent his effective use of the same caliber weapon. In concept at least, the technical approach to this type of Advanced Reconnaissance System leads one to the artificial earth satellite which, with its inherent capability for routine, long duration flight and its apparent capabilities for the collection of reasonably detailed information from the surface of the earth, seems to make a satellite system attractive for strategic and national reconnaissance. (SECRET)

b. Objectives of the Advanced Reconnaissance System

As a matter of general guidance, the following may be considered the intelligence objectives for the Advanced Reconnaissance System:

(1) Continuous reconnaissance (visual, electronic, or other) coverage of the USSR and satellite nations, for surveillance purposes. Timeliness of receipt of the intelligence information is essential, with daily reconnaissance coverage at high resolution the ideal. In consideration of the requirement for earliest availability of the Advanced Reconnaissance System, the engineering progression and Air Force acceptance should be from the lesser to the greater resolution.

(2) The resolvable surface dimension detail should be of the order of 100 feet or smaller. A capability of resolving detail to the degree that objects approximately 20 ft on the side can be positively identified is the optimum in order to positively identify enemy weapon launching sites and associated activity. If this objective can be met, the many other intelligence requirements of larger surface dimension would automatically be satisfied.

(3) The volume of intelligence delivered by this Advanced Reconnaissance System will be staggering. Therefore, the system, in order to be considered complete, must include a suitable associated data handling, recording, reduction, and filing system. The earliest acceptable system must have provisions for automatic data indexing, filing and storage. Final objective will be for completely automatic data processing, interpretation, presentation, and dissemination. All data handling systems conceived for the Advanced Reconnaissance System will be compatible with data handling equipment in contemporary use within the intelligence community.

(4) The accuracy with which points on the earth's surface can be located by the Advanced Reconnaissance System should be studied. While grosser accuracies can be accepted as interim solutions, the finer accuracies should be considered as the optimum and the goal for ultimate complete development.

(5) Thorough investigation of all possible means of improving the intelligence collection capability of the Advanced Reconnaissance System; such as the application of stereo techniques to the analysis and interpretation of television images.

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c. Mission

(1) The primary operational mission of the Advanced Reconnaissance System will be to provide pioneer and surveillance reconnaissance coverage of the territories controlled by the USSR and its allies. The system must be capable of obtaining:

(a) Routine target, mapping, pioneer terrain, weather, and photo intelligence data.

(b) Bomb damage assessment of high yield weapon strikes.

(2) An alternate and co-equal mission for the Advanced Reconnaissance System will be to provide and maintain continuous and comprehensive surveillance of the electronic activities of the USSR as a means of securing basic Soviet intentions, intelligence, and capabilities intelligence. The electronic reconnaissance (ferret) system should be capable of:

(a) Sensing, coding, recording and retransmitting all significant electronic emissions on both a qualitative and quantitative basis.

(b) The location of areas of high electronic densities compatible with the resolution capabilities obtainable.

(3) Each mission carries a firm requirement for a suitable data handling and processing capability

both in the vehicle and on the ground.

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d. Physical Characteristics

The Advanced Reconnaissance System can be described as follows:

(1) A launching base which will consist of all facilities and equipment necessary for the proper launching of the satellite vehicle

(2) A satellite vehicle which will consist of the following sub-systems:

(a) Propulsion stage or stages necessary to boost the reconnaissance pay load to its orbital altitude and once at this altitude to impart the velocity required to establish the satellite on its orbit

(b) Guidance and control equipment to (a) guide the vehicle from the launching base to its orbit and (b) establish and maintain the reconnaissance payload in the correct attitude after it has been placed on orbit.

(c) Reconnaissance equipment that provides useable pictorial reconnaissance information for transmission to a ground receiving station. The alternate mission will require sensing equipment that is capable of detecting electromagnetic radiations instead of physiographic features.

(d) Information storage equipment with a capability of routinely storing the information gathered by the satellite vehicle until it can be transmitted to a ground receiving station.

(e) Transmitter equipment for transmission of the collected reconnaissance information, transmission and reception of any other information that is required to properly operate the satellite and its equipment.

(f) Miscellaneous equipment required for the proper functioning of the satellite; e.g., a transponder beacon to aid in the tracking of the satellite by a ground receiving station might conceivably be used.

(g) An auxiliary power supply to provide sufficient power for all of the satellite's needs.

(h) Provision for self-destruction of the satellite vehicle upon termination of its operational usefulness.

(3) The ground receiving station will consist of the following sub-systems:

(a) Receiving equipment to (a) receive the transmitted reconnaissance information, (b) enable vehicle tracking, and (c) any other information transmitted from the satellite.

(b) Transmitter equipment to transmit any required information to the satellite.

(c) Information storage equipment that will retain the reconnaissance information transmitted from the satellite until it is fully used.

(d) Display equipment that will display the reconnaissance information as it is received and which can also be used for viewing stored information.

(e) Other equipment that is required for the handling, interpretation and dissemination of the reconnaissance data that is received.

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4. GUIDANCE

a. Three parallel system design studies on the "Advanced Reconnaissance System" are currently being conducted under Task No. 2101C, Project No. 1115. The purpose of these studies is to determine whether a useful military intelligence system, utilizing an artificial earth satellite as a carrier, can be foreseen with sufficient definitude to indicate full development at this time. Maximum utilization of these design studies in preparing the System Development Plan is directed.

b. In the artificial satellite we see a platform which at the present time appears to be limited in its military usefulness to that of making observations or relaying communications. This is a vehicle system singularly applicable to use as a reconnaissance system.

The approach to the design of the overall system must be that of assuring a maximum military utility and reliability (since early models of the Advanced Reconnaissance System will undoubtedly be unmanned) of the reconnaissance sub-system; these factors will determine in turn the design objectives of the vehicle with its propulsion and guidance sub-systems.

c. One of the basic advantages of a satellite is its more-or-less unlimited duration of flight. If we were to try to take full advantage of this flight duration capability, it would be necessary to achieve flight equipment reliability far in excess of that which is possible today. There is a point at which a balance can be struck between efforts aimed at improving the reliability of flight components of the satellite, and the economy to be realized from the extended flight duration characteristics of a satellite. The system design studies directed herein should result in a suggested optimum system flight time, for which in-flight components should be designed.

d. In design of the Advanced Reconnaissance System, full advantage must be taken of those components, in existence or under development for other systems, which have application to a satellite-type vehicle system. Activity resulting from this directive must be fully coordinated, within ARDC, with related system developments to insure that no unwarranted duplication of study or design effort exists. Headquarters USAF will undertake necessary inter-service coordination.

e. The proposed test program for the Advanced Reconnaissance System should be oriented so as to maximize the usefulness of the test vehicles to the scientific community in general, as well as to satisfy environmental and engineering requirements of the Advanced Reconnaissance System. The System Development Plan should contain provisions for the fabrication and launching of "research laboratory models" of the satellite test vehicle, capable of obtaining and transmitting to earth valuable scientific data on the space environment and astronomical bodies. Such vehicles should be planned for launching early in the system test program, with the first "research laboratory model" launching prior to 1 January 1959, if possible.

f. In addition to the three system design studies referred to in 4a above, Project No. 1115 encompasses state-of-the-art study and experimental hardware development in the critical component areas of the Advanced Reconnaissance System. The current technical program involves thirteen separate tasks, carried out principally by contract. This program was established to provide state of art inputs to the system design studies; fullest exploitation of the Project 1115 technical program should be insured in this respect.

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5. OTHER INFORMATION

a. SECURITY

Maintenance of proper security of this program is of paramount importance. A basic guide to security will be the following: all information which contains or implies a date of operational availability for the Advanced Reconnaissance System; as well as information pertaining to its progress as a Weapons System will be classified TOP SECRET. Other aspects of the Advanced Reconnaissance System program, including its exploitation of the satellite, will be SECRET. ~~(SECRET)~~

b. USE OF SCIENTIFIC CONSULTANTS

The broad group of the engineering, physical, and geophysical sciences, which is encompassed by a development such as that contemplated in the Advanced Reconnaissance System, requires that ARDC make maximum use of the scientific and technical competence within the nation. This competence should be recognized and utilized when required in a consultant and advisory capacity by the Weapons Systems Project Office responsible for the Advanced Reconnaissance System. Wherever possible, civilian scientists who can contribute to the success of this project should be engaged in the capacity of consultant to ARDC, and the results of their efforts made available to all contractors on an equal basis. ~~(CONFIDENTIAL)~~

c. PRIORITY

Preparation of the System Development Plan directed herein will be carried out under Priority 1A, Precedence II-3. (UNCLASSIFIED)

UNITED STATES AIR FORCE
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This SR is classified SECRET
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